CEYLON.

XIII.--1913.

PROPOSALS

FOR

THE ORGANIZATION OF THE DEPARTMENT OF AGRICULTURE.

By Mr. R. N. LYNE, Director of Agriculture.

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DEPARTMENT OF AGRICULTURE, CEYLON.

The Director of Agriculture to the Hon. the Colonial Secretary.

No. 3. January 8, 1913.

Sir,—I have the honour to submit my proposals for the organization of the Department of Agriculture, Ceylon. Shortly after my arrival I requested each member of the staff to be kind enough to furnish me with a brief account of the work of his division up to the present time, and his views of its requirements under the new Department. Dr. Lock and Mr. Bamber prepared notes on the Experimental Station, Peradeniya; Mr. Green on the Entomological Division; Mr. Petch on the Mycological Division, the Herbarium, and Library; Mr. Macmillan on the Botanic Gardens; Mr. Drieberg on School Gardens, the Ceylon Agricultural Society, and Education; Mr. Harbord on Maha Iluppallama; and Mr. Pereira, the Chief Clerk, on the office. I have thus received very great assistance from these experienced officers, without which I could not have drafted this scheme and submitted it with the confidence I now do. At the same time, much as I feel myself indebted to these gentlemen, I do not wish to suggest that any responsibility attaches to them for the assistance they have given me. I take, of course, complete responsibility for everything that follows.

Title of the Department.

2. The official title should, I think, be "Department of Agriculture, Ceylon," a more appropriate and precise designation than Agricultural Department, though the latter would, no doubt, often be used for short.

Headquarters.

3. Doubts have been expressed of the expediency of making Peradeniya the headquarters of the Department, the traditions of the Royal Botanic Gardens being liable, it is thought, to exercise too exclusively a botanical influence at the expense of the interests of agriculture proper; but I do not myself share this view. Agriculture and botany are closely allied subjects; cannot, indeed, be separated; but in a Department of Agriculture the danger is, if anything, for botany to become neglected, not agriculture. My anxieties are that the priceless treasures of the Royal Botanic Gardens should not suffer, as they would be likely to do if special provision for preserving them be not made.

4. On the other hand, there are, I think, strong reasons for making Peradeniya the headquarters of the new Department. The connection with the past will not even nominally be severed, and the name of Peradeniya already identified with research will be carried on. In many of our Colonies the sequence has been similar to that of this Island. First, the botanic gardens for studying the local flora and establishing specimens of economic exotics; then the Department of Agriculture to apply the accumulated information and resources in a more extensive way for the benefit of the agricultural industries of the country. In the gardens, the herbarium, the library, the museum, the laboratories of Peradeniya, the new Department will have an equipment of which the fullest advantage should be taken, and this can only be done by the Director making Peradeniya his headquarters.

5. Again, the Director cannot be separated from the principal members of his staff without seriously hampering the work, and if he took up his residence in any other place than Peradeniya, the staff, the clerks of the head office, as well as the library and herbarium, would have to follow him at considerable expense to Government.

6. Peradeniya enjoys a climate spoken of as, taking it all round, the best in Ceylon—a consideration not to be ignored. Furthermore, it is within four miles of Kandy, the headquarters of the Ceylon Planters' Association. Its road and railway communication are excellent, and there is no part of the Island, leaving out of account uninhabitable jungle, that cannot be reached from Peradeniya in one day.

7. I do not hesitate, therefore, to recommend that the Royal Botanic Gardens be made the headquarters.

General Plan of Organization.

8. One important point to keep in view is that of being able to fix the responsibilities of every responsible member of the staff, and another is freeing the Director as far as possible from the danger of getting clogged up with detail. The Director's business is to co-ordinate the work of the various divisions of the Department, directing them along lines in which they can combine for the common good of the agriculture of the country. He cannot do this properly if he is concerned with the immediate superintendence of any particular branch of work. In order that all interests may receive like attention, and that none should suffer through neglect, the Director should have between him and every division a responsible head whom he can charge with the responsibility of giving effect to decisions that are taken, and of keeping the work of the division up to a proper state of efficiency.

9. The present needs of the Department can be met by organizing it as follows:—

(1) Division of Mycology and Botany.
(2) Division of Experiment Stations.
(3) Division of Entomology.
(4) Division of Chemistry and Rubber Research.
(5) Division of Horticulture.
(6) Division of Low-country Products and School Gardens.
(7) Division of Agricultural Education.

10. There would thus be seven divisional heads and a chief clerk. It will be observed that no provision is here made for an Assistant Director of Agriculture, and under such an organization I do not think an Assistant Director is required, at least for the present. Each divisional head might be considered and would in fact be an Assistant Director.

11. In a country, as in some Colonies, where the Department of Agriculture is small, consisting perhaps of a Director and one or two plantation superintendents and a second responsible officer is required, an Assistant Director is often the most useful appointment that can be made, especially if the country is large and the Director has to undertake long expeditions. Or, again, when departments are very large, an officer to represent the Director becomes necessary, though in that case he would more correctly be styled Deputy Director. But in Ceylon the duties of an assistant would be rather difficult to define at present ; there would be a danger of misunderstanding and friction ; and if the plan I suggest be accepted and the Director relieved of all immediate superintendence, the Director should, I think, be able to give his personal attention to the affairs of each division.

12. If the Director is provided with an adequate staff of responsible officers, he can give effect to the other important condition of success to which I have referred, and which I believe to be an indispensable condition if things are to get done, namely, the fixing of responsibility. This, of course, hypothecates the delegation of powers on the part of the Director, as no one can be held responsible for the discharge of duties committed to him unless he is given power with which to work.

Division of Mycology and Botany.

13. I recommend the separation of the herbarium from the gardens, placing the former under a systematic Botanist and the latter under a Horticulturist. The gardens have grown to such dimensions and importance that they should now come under the control of a specially qualified officer of senior standing. But in the case of Botany and Mycology the present needs of the Department will, I think, best be met by combining them under one officer with an assistant. During the last seven years the mycological work has increased tenfold. Many of our diseases are new and have to be worked out, entailing a considerable amount of research work, which one Mycologist, frequently called away for other duties, cannot adequately perform. We, therefore, require an Assistant Mycologist. But these two officers would at the present time be able also to undertake the botanical work of the Department.

As head of the division I propose a Government Mycologist and Botanist, and under him an assistant fully qualified in botany with a knowledge of fungus cultivation and some bacteriology if possible.

14. As in the case of the Division of Entomology, a native assistant is required, and I propose him for the same terms, namely, three months on probation.

15. His particular work would be sterilization of flasks, preparing culture solutions, attending to the mycological herbarium and pathological collections, collecting specimens of diseases, and carrying out simple chemical manipulations.

16. The Mycological Laboratory seems never to have been properly equipped, and a sum of Rs. 6,000 is required for the following :—

	Rs.
Gas installation, autoclave, incubator, embedding bath, microtome, dry heat sterilizers	4,500
Microphotographic apparatus, herbarium cupboards for mycological herbarium, proper sinks in laboratory, book cases, part of a room partitioned for working with bacterial and fungus cultures, hood for transferring cultures, case for storage of cultures, additional glass and chemicals, tiled walls in one of the present rooms and flush windows, plate glass in lower frames of laboratory windows ..	1,500

Division of Experiment Stations.

17. There are two experiment stations, namely, Peradeniya and Maha Illuppallama, but to these have also to be added the two Botanic Gardens at Henaratgoda and Hakgala, as experiments are to some extent carried on in them also.

Peradeniya.

18. Peradeniya, or Ganoruwa, to give it its real name, is situated on the opposite side of the river from the Gardens, and was taken over early in 1902. It has thus been established ten years. It was an old cacao estate badly cankered, and smothered with albizzia, coconut, arecanut, sapu, and other trees ; in all about 150 acres under cultivation out of a total of 547 acres. Experiments have been conducted and are still in progress with cacao, rubber, coconuts, tea, citronella, green manures, and various other products, the results having been published from time to time in Circulars, Administration Reports, and the Tropical Agriculturist.

19. The great drawback of Ganoruwa is its small cultivable area, especially felt with regard to the Hevea experiments. We need a plantation of 100 acres of Para and another 100 acres or so of land in which to carry out spacing experiments. The experiments would then carry much more weight than they can ever do with the limited areas we can now place under trial. There are some 20 acres or so suitable for rubber, and these I hope will be planted next season. The main work of Ganoruwa for some years to come will doubtless be concentrated with investigations in the planting, cultivation, and tapping of Hevea, though this does not mean, of course, that other products will in any way be neglected.

Maha Illuppallama.

20. This station was opened in 1903 for trials in cotton growing in the North-Central Province, " (1) to determine whether Indian cotton can be remuneratively cultivated by villagers for the local market, and to find out the best kind of this cotton to grow and the best way of treating it ; and (2) to determine whether cottons of long staple, such as are required for the Lancashire market, can be profitably grown with or without irrigation in the dry regions of Ceylon." The cotton experiments were to be supplemented by experiments with other products likely to succeed in the dry zone, planted in belts between the different kinds of cotton.

21. Great care seems to have been exercised in the choice of site, and though I have not been able to find any record of the reasons for finally deciding upon Maha Illuppallama, the character of the

soil, described as good, and the presence of an area of black cotton soil appear to have given Maha Illuppallama the preference over other available irrigable areas inspected in the Province.

22. First sowing took place at the end of September or early in October, 1904, on a block of 35 acres with Upland seed, and sowings have been continued every year since; that is to say, for seven years. In four of those the crops were partial or total failures; in the remaining three less than half crops were obtained.

23. The trials have, I think, clearly demonstrated the unsuitability of Maha Illuppallama for Sea Island and Egyptian cotton with or without irrigation. American proved the best of the three, but yet not satisfactory. No trials seem to have been made with Indian cotton. Caravonica and Peruvian and Bahama tree cottons were tried in 1904, with no success.

24. The causes of failure are stated to have been—

(1) Shortage of rain in the planting and growing season;
(2) Continuance of rain during anticipated dry period;
(3) Unsatisfactory growth and uneven flowering produced by irrigation;
(4) Bad seed;
(5) Ravages of insects;
(6) Strong winds;

to which, I think, may be added insufficient preparation of the land in some cases.

25. It having been shown that cotton cannot be successfully grown at Maha Illuppallama, I see no reason for continuing the trials.

A New Dry Zone Station.

26. Maha Illuppallama was not opened as an experiment station for the dry country. As an experiment station there are two serious objections to it, one being that it does not seem to be properly in the dry country, the other that it is very inaccessible. During the year 1911–12 twenty-two people signed their names in the Visitors' Book, chiefly callers or Government officials, very few being *bona fide* agriculturists interested in the experiments. The Superintendent reports: "Very few persons have ever visited the station, not through lack of interest, but owing to the great distance (thirteen miles from the railway), and the fact that there has been no accommodation available at the place." Our dry country experiment station should be in a populous centre like Anuradhapura that a large number of natives visit and on the railway, so that visitors can easily reach it and obtain accommodation when there. Maha Illuppalama is thirteen miles from the railway, with no connecting public conveyance.

27. I recommend, therefore, that a more central site, as, for example, Anuradhapura, be obtained for a dry zone experiment station, and that Maha Illuppallama be carried on as a subsidiary station for the sake of the coconuts, or else leased or sold, with the proviso that the records of the 40 acres of coconuts are available for Government.

28. There is no need for me to press the question of the necessity of a dry country experiment station so long as such large areas of our low dry lands remain unoccupied and unproductive. Date cultivation, sisal hemp, sugar cane under tanks, cotton, tobacco, fruit, coffee, Ceara rubber, coconuts, and the application of the principles of dry farming to these regions are among the subjects requiring investigation.

29. I do not wish to commit myself to Anuradhapura as the most favourable site for the station till I have ascertained beyond doubt that it is fairly typical of the dry zone, a point upon which some doubt seems to exist. But in other respects it would be most suitable, and when the Mannar railway is opened, it will become an even more important centre than it is at present.

Henaratgoda.

30. The old and original Hevea trees at Henaratgoda possess, I think, many lessons for us on the subject of spacing. The great size of the trees planted on the outside, where they have had plenty of room from one direction, as compared with inside trees crowded together is quite remarkable, and if they yield correspondingly, they will provide strong arguments in favour of wider planting.

Sub-Tropical Products.

31. Hakgala, from an experiment point of view, will form a base for investigating the possibilities of the patanas with sub-tropical products and industries. Maize, wattle bark, lucerne, ostrich farming, cattle rearing, merino sheep, angora goats are among the possibilities for these pampas, but there is not the same urgency with them as with questions affecting existing industries in which large amounts of capital have been invested.

Coconuts.

32. At a meeting of representatives of the coconut planting industry held in the Legislative Council Chamber on December 16, which I had called to consider what steps should be taken to investigate questions connected with that industry, it was the opinion that an experiment station should be opened at Chilaw. I will submit proposals later on to give effect to this view.

Low-country Products.

33. A trial ground will also be required at a selected spot, probably somewhere between Kalutara and Galle, for the experimental cultivation of low-country products and the introduction of fruit and vegetables. The station will come under the control of the Division of Low-country Products and School Gardens, but the records will be placed at the disposal of the head of the Division of Experiment Stations the officer responsible for tabulating the results of all experiments connected with the cultivation of economic products conducted by the Department.

Tobacco.

34. My proposal for investigating the cultivation and preparation of tobacco have already been submitted in my letter No. 232 of November 2, 1912 (enclosure No. 1).

Cotton.

35. Trials are this season being made on 58 different plots, of 57 acres in all, distributed throughout the various Provinces. This method of carrying out cotton trials, namely, by a number of plots in different parts of the Island, is, I think, preferable to concentrating in one place, as was done at Maha

Illuppallama. If after a number of trials a locality is found to be unsuitable, the plot can be abandoned without any sacrifice of buildings, roads, &c. We can in some cases utilize the school gardens as trial grounds under the supervision of the Agricultural Instructors.

Paddy.

36. Many problems await solution with regard to the cultivation of paddy, among them being the introduction of labour-saving implements and transplanting. Paddy cultivation is, however, a very involved business, every district possessing its own distinctive methods ; and the only way to achieve any results is to have a small experimental plot in each district. But first we must undertake a thorough survey of all the different methods in vogue, and this I am now engaged upon.

Poultry.

37. Poultry and eggs are both imported into Ceylon. In the year 1909, the last whole year for which Customs returns are available at the time of writing, 88,616 game and poultry, the greater part from British India, and presumably fowls, were imported into Ceylon, and 759,464 eggs, also principally from India. These are not large figures, yet it would be more satisfactory if the Rs. 65,000 they represent in value were expended in Ceylon villages with a substantial balance added on account of exports. One reason why Ceylon people are not great poultry rearers is, I think, their habit of herding together along the roadside. In Ceylon villages the houses join one another in two rows flanking the road. These conditions are not favourable for poultry runs. If the cottages, instead of being wedged together in one lane, were scattered about, each surrounded by its garden, fowls would have room to run about, and the condition of our poultry farming industry would then, I feel sure, be on quite a different footing.

38. If we can never expect under these conditions to accomplish much in increasing the quantity of stock, we can improve it by introducing good laying breeds and table fowl, and the new Department of Agriculture will be required to take up this question.

39. I should deprecate, however, any attempt to treat it in a casual way, as, for instance, by importing fowls for one of the stations, in the expectation that the superintendent or conductor can look after them by detailing some coolies to attend and feed them. The poultry section should be established on a properly organized footing under a trained attendant; runs laid out so that each breed can be isolated and kept pure; incubator houses and proper packing equipment attached. It would not be necessary to embark at first upon an ambitious scheme ; it would be better to begin in a modest way and grow in response to demand. I am inclined to think that the dry zone experiment station would be the most favourable site at which to establish the section, especially if it is opened at Anuradhapura, a populous native centre. Poultry farming might prove a suitable industry for the waste lands of the dry zone, especially near the railway. Peradeniya is cramped; though the section would have a great educational value for a School of Agriculture established at Peradeniya.

40. The Poultry Club, which has already done a considerable amount in the direction of introducing new stock, could afford the Department great assistance with the experience they have gained, and it would no doubt prove to their mutual advantage to work in sympathy.

41. I am making no preparation for a poultry section next year, as we are not yet ready to arrange for it.

Sericulture.

42. The Salvation Army sericulture station at Peradeniya Junction has not yet succeeded in making much progress in the direction of introducing the culture of the mulberry silk worm in the villages, principally on account of the Buddhist dislike to the taking of life and the practice of killing the moth before it emerges. Eri silk is of an inferior quality, and it is believed that it proves more profitable to cultivate the mulberry worm and suffer some loss in allowing the moth to rupture the cocoon and liberate itself, thus overcoming the scruples of the Buddhists, than to cultivate the Eri silk worm, the cocoon of which undergoes no injury from the moth escaping.

43. But to make any headway with sericulture among the peasantry, we should, I think, make this a subject in the course of training for teachers at the Peradeniya School of Agriculture when established. Classes could be sent down to the Salvation Army's station, which is close by, for instruction.

Head of Division.

44. The Division of Experiment Stations will thus comprehend the following :—

(1) Experiment Station, Peradeniya.
(2) Experiment Station, Dry Zone.
(3) Hevea Trees, Henaratgoda.
(4) Hakgala.
(5) Tobacco at Jaffna, Teldeniya, and other places.
(6) Cotton in School Gardens and Trial Plots.
(7) Coconut Trial Grounds.
(8) Records and Statistics.

45. In order that the experiments may be efficiently conducted and the results properly recorded, co-ordinated, and made available for the public, it will be necessary to place the division in charge of an experienced officer of senior standing trained to experiment work and to recording results for reference and publication. I would propose for him a salary of £600 rising to £750 by annual increments of £50, and a house.

DIVISION OF ENTOMOLOGY.

46. I regret very much to hear that the gentleman whom I recommended as Mr. Green's successor (No. 162 of July 16, 1912) expresses himself as unable to accept the post of Entomologist of Ceylon on the salary offered, and has declined the appointment. The salary is £400 rising to £600, but the lower sum is not sufficient inducement for an experienced Entomologist, though it would suffice for a young man with his practical experience to gain. But I do not consider we are justified in committing the welfare of our planting industry with its millions of pounds of invested capital to the keeping of any but a thoroughly experienced Entomologist accustomed to field work, to the responsibility of identifying attack, and able to advise and give demonstrations in the application of remedies.

47. I therefore submit for consideration the advisability of raising the salary of the Entomologist to £500 rising by £50 per annum to £650, and a house.

48. A trained native assistant is required to take charge of the valuable collections, attend to their proper preservation, mount and label specimens, and conduct, under the supervision of the Entomologist, special experiments in the field. The Entomologist, single-handed, cannot give the necessary attention to the collections that have accumulated during the period of twelve years since the division was established, consequently many of the earlier specimens have been ruined through the evaporation of spirit, or by the attacks of predatory insects. The specimens at present are crowded into shelves in congested disorder owing to want of space, of office furniture, and of some one to arrange them.

49. The assistant probably would not at first be trained. The proposal is to engage a young man from one of the colleges of the Island who has completed his education satisfactorily and possessed an aptitude for zoology, as to which we should obtain information from his science master. For the first three months he would be on probation, and on proving satisfactory I would recommend that he be placed on the permanent establishment.

50. The entomological laboratory is unprovided with scientific apparatus beyond glassware, such as wash bottles, test tubes, preserving jars, &c., the microscopes being the private property of the present incumbent. The following are required :—

Monocular microscope with mechanical stage and substage fittings (£15).
Camera Lucida and objectives ranging from 2 in. to ⅛ in. (£12).

Division of Chemistry and Rubber Research.

51. In my letter No. 191 of August 23, 1912, paragraphs 19–34 (enclosure No 2), I set forth my proposals for rubber research work, and these have now received the sanction of the Secretary of State. A sum of Rs. 12,000 will be required for carrying them on next year (*i.e.*, Rs. 15,000 for the fifteen months). Pending the possible arrival of Professor Dunstan to confer with the Committee on the general plan of work, so that the Imperial Institute may be fully aware of the lines of investigation to be followed in Ceylon, and that we in Ceylon may understand what precisely it is proposed to do in London, I postpone further reference to this subject.

52. It should be understood that the record of results should be communicated to the Head of the Division of Experiment Stations, not for publication over his name, but that we may have one complete and comprehensive record kept up of all experiments connected with the cultivation of economic products conducted by the Department.

53. In paragraphs 19 and 20 of the letter above referred to I explained the position of the chemical arrangements of the Department as they presented themselves to me. It had been stated to me that the present system of a retaining fee to Mr. Bamber was unsatisfactory, but nothing could be quoted for this opinion, nor anything tangible and concrete given me as grounds for proposing that it should be altered.

54. During the four months that have elapsed since writing that instances of the inconvenience of the system have come under my personal experience. Inquiries on chemical questions have been received, but could not be attended to as promptly as they should have been owing to the absence of the Government Chemist. The services of an officer who is not in regular residence either a whole or a part of his time, but whose movements are always uncertain, cannot be utilized to any great extent ; on account of this uncertainty they are used very much less than they might otherwise be.

55. Mr. Bamber's initiative, knowledge, and experience of Ceylon and plantation products is considerable, and I should regard it as a serious blow to the Department if anything occurred to interrupt his connection with it. He has been of the greatest service to me with my new work. In order to meet the objections I have raised and regularize his position, I recommend that during the first fortnight of each month he should reside at Peradeniya. This arrangement would also ensure the presence of the Government Chemist at the meetings of the Committee of Agricultural Experiments.

Division of Horticulture.

56. Under this heading I include the Royal Botanic Gardens at Peradeniya and the Hakgala and Henaratgoda Gardens. The principal qualifications required for this post are knowledge of nursery work and gardening in Ceylon ; administrative ability, in which I include ability to manage a labour staff ; and a good knowledge of plants, especially Ceylon plants. The training required is quite different from that of a systematic Botanist, and it would, I consider, be a certain cause of friction to impose any one between the Director and the officer responsible for the practical management of the various gardens.

57. In my letter No. 191 of August 23, 1912 (enclosure No. 3), I pointed out (paragraph 8) that the interests of the Ceylon public who provide the money for their upkeep should come first at Peradeniya, and that we should endeavour to make the gardens as popular as possible from every point of view without sacrificing any part of their value to the scientific world.

58. The public desire, first of all, to be able to secure plants and seeds for their gardens. This want is to some extent supplied, but I think very much more could be done. There is no desire to interfere with local enterprise, but the resources of their gardens being in excess of its own requirements the public should be entitled to benefit thereby, and be able to purchase seeds and plants at reasonable prices.

59. The nurseries consist of different plots, some of which have been allowed to grow into jungle. It is my intention to replace these with one large nursery in charge of a nurseryman with an adequate staff, in which supplies of plants can be kept in stock for our own needs and those of the public, and which the public can visit for educational purposes. A properly conducted nursery, to serve as a model for private establishments, should be a conspicuous feature of the gardens.

60. The public visit the gardens for the purposes of recreation and also for instruction, but in order that it may derive the fullest advantage from them I think the system of labelling should be altered. At present the label bears the botanical name and country of origin, only occasionally a description or the popular name being added. Such labels convey nothing whatever to the vast majority of the people who visit the gardens. I am therefore altering this system, placing at the top of the label the popular name of the tree or plant if it possesses one, then the botanical name, adding a brief description, such as rubber, oil, tannin, dye, spice, drug, perfume, foliage plant, flowering shrub, fibre, timber, and also place of origin. Each plant should bear a serial number for cataloguing. Henaratgoda had no labels at all, and Hakgala only a few.

61. The public also apply to Peradeniya to ascertain the names of plants, but such inquiries are not numerous.

62. Occasionally, too, applications are received for assistance in laying out gardens and for the services of a gardener. The latter we are unable at present to supply, but we should, I think, make provision for training students in garden and nursery work.

63. The staff would consist of a Superintendent of the Division of Horticulture, and under him the following officers:—Curator, Royal Botanic Gardens; a qualified gardener with a knowledge of systematic botany, grafting, propagating generally, and able to teach native gardeners; Curator, Hakgala; Conductor, Henaratgoda.

64. In order to make sure that every part of the Royal Botanic Gardens shall come under systematic inspection at least twice a year, avoiding the risk of parts out of the usual beat being neglected, and also that progress in their improvement may be steadily maintained, it has been decided that staff inspections shall take place monthly by members of the senior staff who happen to be at Peradeniya when they occur. A Committee has also been appointed to meet once a quarter, make a general inspection of the gardens, and consider questions upon which the staff inspection sought their advice. The Committee is composed of the Director of Agriculture (Chairman); the Hon. the Government Agent, Central Province; the head of the Division of Horticulture; E. E. Green, Esq.; T. Petch, Esq.; J. H. de Saram, Esq., C.M.G. (enclosure No. 4).

Hakgala and Henaratgoda.

65. Hakgala, though about six miles from Nuwara Eliya, seems to be a popular resort of visitors, but I think the station might be turned to some account for making trials with crops suited to high elevations such as I have enumerated (paragraph 31). Under the present system the Director is himself responsible for supervising the work of the Curator of Hakgala and the Conductor of the Henaratgoda Gardens, and as he can only pay visits at long intervals, both Hakgala and Henaratgoda have to be left to look after themselves. With a head of division in charge I hope to be able to make them more useful as supply stations and more attractive to the public.

DIVISION OF LOW-COUNTRY PRODUCTS AND SCHOOL GARDENS.

66. Under this heading I propose to collect the work now done by the School Gardens and part of the staff of the Ceylon Agricultural Society, including that of the Agricultural Instructors. This change would not be so great as might appear, because the work of both the Gardens and the Society is under the control of one officer, Mr. Drieberg, who in his capacity of Superintendent of School Gardens is a member of the staff of the Department of Agriculture. The Government gives two annual grants totalling Rs. 30,000 to the Society and the Board of Agriculture, so the Society, though not a Government Department, is nevertheless under the control of Government.

67. I propose as head of this division Mr. C. Drieberg, B.A., the Superintendent of School Gardens and Secretary to Ceylon Agricultural Society. His abilities and experience, which are well known to the Government, make him, in my opinion, particularly qualified to take charge of this branch of the work of the new Department, which will be chiefly concerned in promoting the interests of agriculture in the low-country. My proposal comprehends transferring the Instructors and part of the clerical staff to Government Service. In a separate letter I am dealing with these proposals in detail.

School Gardens.

68. I have visited a number of these gardens. They were started with the object, I believe, of educating the young generation to appreciate better methods of agriculture, but they have also been instrumental in introducing new vegetables and fruit in various parts of the Island.

69. Their utility might be extended, I think, in two ways: first, by using them—or parts of them—as experiment plots for such economic products as cotton, tobacco, rubber. Under the new arrangement this could be carried out, as the Agricultural Instructors would be placed in charge of the School Gardens, each in his own district. In order that the work of the School Gardens may be organized and conducted upon uniform lines, the system of bringing them under periodic inspection should be maintained, but instead of calling the visiting officers Assistant Superintendents as at present they would be styled Inspectors. Under the existing system the Inspectors go on circuit in turn, one always remaining in the head office; but I have arranged that in future each one shall be placed in charge of three Provinces, residing at some central place within his charge. This arrangement will enable me to fix more effectually the responsibilities of these officers. The Inspectors would possess no authority over the Instructors, their duty being to report to the head of the division, though at the same time the Instructors would be expected to pay attention to recommendations made to them by the Inspectors.

70. Work in the School Gardens would, I think, derive great encouragement by introducing a spirit of competition among the boys and the bestowal of a greater number of awards. A beginning has been made at one school, and if successful the system will be introduced into other selected schools. At present only Rs. 500 is allotted for awards to teachers, permitting of only one or two being made in each Province. My proposal is for giving awards both to teachers and pupils, for which a vote of Rs. 2,500 would be necessary, *i.e.*, Rs. 2,000 more than the present vote, under the head School Gardens.

The Ceylon Agricultural Society.

71. My investigations into the Society's operations in the Provinces have led me to the conclusion that, though much excellent work has been done, it has not been conducted upon pre-arranged lines, so that it becomes somewhat difficult to define what has been accomplished. It seems to me very necessary that the work should be organized under different headings, and I would suggest the following.

72. *Meetings.*—It has already been decided that papers should not be read at the quarterly Board meetings, but at meetings of the Society following Board meetings, and I have further recommended that these Society meetings should take place at, say, 6.30 P.M. instead of noon, the hottest and busiest time of the day. The new arrangement might be given a trial. Papers should be short, and several arranged for.

73. *Publications.*—I have submitted my views with regard to the Magazine (Tropical Agriculturist) (No. 224 of October 24, 1912), and pending the results of the negotiations now in progress for giving effect to them, I have nothing further to say on that matter. At present the Society issues leaflets on special

topics, but I think it might go a step further and reprint from time to time in booklet form articles and papers by well-known authorities that have appeared in the Magazine, collecting several together relating to the same subject. We should thus accumulate a useful series of manuals on such topics as coconuts, cinnamon, citronella, cotton, tobacco, paddy, vegetables, fruit, fibres, sugar cane, cattle, buffaloes, rubber, tea, &c. The aim should be to reproduce in the manuals original articles by recognized authorities in Ceylon, though this rule should not be too rigidly adhered to in exclusion of other matter that would manifestly add to the value of a manual.

74. *The Govikam Sangarawa*, which is the Sinhalese Agricultural Magazine (the only publication of its kind in the Island), has a circulation of 3,000, and is published monthly. It caters not only to the Sinhalese-speaking members of the Society, but also reaches the hands of vernacular schoolmasters and most village headmen. Its influence as an educational agent is an important one, and there is reason to believe that it meets a distinct want justifying its enlargement and general improvement.

75. *The Kamal Tolil Velakam* is the Tamil Magazine edited by Mr. S. Chelliah, and also published monthly. The cost of this publication to the Society is Rs. 200 per annum, given in the form of a grant, the editor taking all risks. The circulation is about 250.

76. *Seed Distribution.*—The co-operative purchase of seed for distribution at cost price among members is very much appreciated and an important branch of the Society's work, some 2,670 packages being distributed annually. In this respect the Society becomes a Co-operative Agricultural Distributive Society, similar to those in England, except that the English societies undertake the collective purchase of manures and implements also, and the collective sale of members' produce.

77. *Shows.*—Shows at present are organized by the Government Agents and Assistant Government Agents acting in their capacity as administrative officers ; but I think the shows should come under the control of the Committees of the branch societies where they exist, presided over by the Government Agents or Assistant Government Agents working in connection with a Sub-Committee of the Board. This would enable the parent society to use the experience gained in one part of the Island for the benefit of another, leading, for example, to the simplification of catalogues and increase in revenue and prizes.

78. At one of the principal provincial towns of the Island the Society should aim at holding a large central show once a year if possible, completing the circuit of the Island in about ten years, ending up with an All-East Exhibition at Colombo.

79. *Branch Societies.*—The influence of the parent Society should be directed to encouraging the formation of branch societies and extending the range of its activities through their agency. Branch societies on their part could be instrumental in promoting the co-operative credit movement, on which the hope of improving the financial conditions of the goiya so much depends. The Society will, however, grow into this part of its work adapting itself to circumstances and conditions as they arise. I am now engaged in drawing up proposals for the working of the Co-operative Credit Societies Ordinance.

80. The work of the Society may, I think, therefore be organized under these headings :—

(1) Meetings.
(2) Publications.
(3) Co-operative Purchase of Seed and Plants.
(4) Shows.
(5) Branch Societies.

Under this new scheme of reconstruction the Government grant-in-aid to the Society and the Board of Agriculture would be reduced from Rs. 30,000 to Rs. 8,000.

The Board of Agriculture.

81. With a Department of Agriculture, a Planters' Association with branches in every district, a Low-country Products' Association, a Committee of Agricultural Experiments, the Board of Agriculture is left with very little to do except to control the financial expenditure of the Ceylon Agricultural Society. In the past it has identified itself with initiating experiment work, and it seems to me not unlikely that circumstances may so shape themselves as to bring the Board and the Committee of Agricultural Experiments into close connection perhaps eventually to combine in one body.

The new experiment work in contemplation, comprising tobacco cultivation at Jaffna, Teldeniya, and other places, a dry zone experiment station probably at Anuradhapura, coconut trial grounds at Chilaw, Veyangoda, and the Southern Province, a low-country products experiment station in the Southern or Western Province, at Hakgala, besides Peradeniya, will necessitate the Committee itself being re-organized as a number of Sub-Committees, with the General Committee meeting perhaps twice a year.

The Board and Committee will overlap, and though it is premature at present to draw up any proposals for uniting the two, this seems to be the direction we are likely to take.

For the present I advocate a reduction in the size or a reconstruction of the Board. Only about 14 per cent. of the members at present attend meetings. It is undesirable to overload it with names of gentlemen who cannot give the time to the work ; but, on the other hand, if it is to establish for itself a position of commanding weight and influence, it should call to its councils experienced men representing all branches of Ceylon agriculture willing to make sacrifices of time and trouble in the interests of the public.

Division of Agricultural Education.

82. I do not feel yet in a position to lay before His Excellency detailed proposals for placing agricultural education on a systematic footing, because an initial step has been taken, and it will be better before going on to define precisely the next step to await the results of the first ; but I am able to sketch the general lines that I think we should follow.

Schools of Agriculture.

83. Four students have been sent to Poona. They have been there one year, and have two more years to complete. The scheme provides for the establishment of four provincial agricultural schools (paragraph 7 (*d*), No. 1, of Sessional Paper VII. of 1911) for the instruction of Low-country, Kandyan, and Tamil teachers. We can make no real headway with agricultural education in Ceylon till we have first educated teachers, and these schools of agriculture would be for the purpose of educating teachers.

84. We should draw the students from selected pupils at the Training College at Colombo and other colleges and schools throughout the Island. The men would be trained with the object of appointing them teachers in the Government schools, though not necessarily exclusively with that object, so that in the course of time all our schools would be presided over by men who had gone through a course of training and qualified themselves for teaching agriculture. Present teachers should be given an opportunity of taking the course if they desired to do so ; but I think it should be generally understood that the policy of the Government contemplated the change I have indicated.

85. Under such a system children would grow up as familiar with the rudiments of agricultural science as with ordinary school topics, and this could not but bring about a tremendous change in the whole point of view of the village agriculturist to the advantage of the agricultural industries of the Island.

86. Two publications are in preparation to provide simple courses for teachers. The Principal of the Training College, Colombo, is writing a book for a simple course on nature study and elementary science notes, and the Secretary of the Ceylon Agricultural Society has written a Reader. Both are to be published in the vernacular, and will serve a useful purpose in preparing the ground ; but they cannot be regarded as a serious step towards grappling with the subject of agricultural education.

87. Accommodation would have to be provided for a certain number of resident students.

College of Tropical Agriculture.

88. The question of a College of Tropical Agriculture is one that I think is now ripe for consideration. There is at present no place where young men desirous of making tropical agriculture their profession in life can undergo a training. In all the Dominions colleges have been established for providing a thoroughly practical and scientific course for those wishing to make farming a career. It is time to make corresponding provision for tropical agriculture. This fact has been recognized and accepted at home, and Ceylon has already been mentioned as well suited for a College of Tropical Agriculture. It is conveniently placed in the ocean highway, and would serve equally the Asiatic East, East Africa, and Australia.

89. Whether or not a College of Tropical Agriculture is established in other parts of the world, it is certain that here in the East we shall require one, and I urge that the Government take the matter up in response to the allusions that have already been made to Ceylon as the place indicated. Within a radius of 100 miles of Peradeniya all the leading planting industries of the world, with the exception of sugar and sisal hemp, can be seen under prosperous working conditions ; that is to say, coconut planting, desiccated coconut, coconut fibre, rubber, cacao, tea, citronella, cinnamon, tobacco ; cotton and sisal hemp will be taken up by the Department ; cardamoms, camphor, vanilla, cloves, nutmegs, pepper, and all tropical spices and fruits thrive in varying degrees ; the greatest sugar-producing country in the world—Java—is within a few days' steam.

90. Peradeniya has a healthy climate, is well served by railway and road, and is already identified with research work, students being specially sent out to study preparatory to taking up appointments in other parts of the world.

91. The case for a College of Tropical Agriculture being, as I think, undoubtedly made out, and Ceylon having such obvious claims, I see no advantage in postponing the question.

92. I recommend, therefore, that while we are about it, we should grapple with the subject of agricultural education in the comprehensive way I have indicated, to ensure that the youth of the Island shall grow up well grounded in the principles of agricultural science, and to provide for the imperial need which has arisen as a consequence of this prosperous and expanding industry of the tropics. If desired to do so, I should be glad to outline a scheme for giving effect to the foregoing proposals.

I have kept these establishments distinct because they will serve two quite different purposes. Through the medium of the schools it is hoped to reach the peasantry, thereby raising village agriculture to a higher level. For this purpose the teachers must be well grounded in the elementary principles of agriculture, including a little agricultural botany and chemistry, but it is not necessary for them to know the chemistry of the coagulation of rubber latex, for example, or how sisal and fourcroya fibres are prepared. A six months' training should be sufficient for students in the schools of agriculture.

The College of Tropical Agriculture would be established on the lines of the great Agricultural Colleges of the Colonies, except that students would be taken through a course of tropical agriculture instead of temperate ; that is, instead of lectures being given on wheat, oats, barley, turnips, Lincoln and Leicester sheep, for example, they would be upon coconuts, cacao, tea, rubber, spices, sugar, fibres, tobacco, cotton, &c. The botanical, entomological, and mycological courses would be specialized in the same way, though chemistry would in the main follow along the lines of ordinary agricultural chemistry. The course would, perhaps, take two years for students with no previous scientific agricultural training ; one year for trained men who desired to specialize in tropical agriculture. It would be open to students of all nationalities, and would specially aim at serving Ceylon and the East and East Africa, though students from West Africa and the West Indies would, of course, be equally welcome.

The schools and college though distinct in their aims would come under one control and organization, and it would probably be found convenient to provide for a certain overlapping of lectures and field demonstrations.

The sphere of influence of the schools would be greatly extended if special provision were made for students from grant-in-aid schools under the hostel system as proposed for the Colombo University College, and I would suggest steps being taken for establishing the hostel system in connection therewith.

HEAD OFFICE.

93. The new activities upon which the Department is, I hope, about to enter will throw a considerable increase of work upon the clerical staff of the head office, already augmented by the necessity of bringing the clerical work of Ganoruwa under its control, and it will become necessary, I think, to provide the Director with an Office Assistant to relieve him as much as possible of routine duties, setting him free to devote his time to the performance of those duties which he alone can perform, in directing

the work of the Department and promoting the interests of the agriculture of the Island. I do not propose this appointment for next year, but I recommend that the Chief Clerk be permitted to sign formal documents for the Director.

94. Two additional appointments to the clerical staff are for the present required, namely, an accounting clerk and a typist. The clerk now responsible for the accounts is not a trained accounting clerk, and has, moreover, other duties to perform. With a proposed expenditure of about Rs. 350,000, I think it is expedient that we be provided with a properly trained accounting clerk.

95. At present some of the clerks, notably the Chief Clerk, have frequently to attend office before and after hours and to work on holidays and Sundays. This is because they are taken off their proper duties for typewriting. The appointment of an efficient typist would relieve the congestion in the office, and enable the indexing and filing, some of which has had to be abandoned, to be kept up.

R. N. LYNE,
Director of Agriculture.

Enclosure No. 1. (Letter No. 232 dated November 2, 1912.)

I have the honour to inform you that I have been studying the question of the cultivation of tobacco in Ceylon, and as this question is one the Government cannot, I think, leave where it is, I submit for consideration of His Excellency the opinions I have formed.

2. According to Mr. van Leenhoff, the Maha Illuppallama trials failed because (1) the planting season was wrongly chosen; (2) production of seedlings was bad; (3) seed was not selected; (4) no proper manuring was done; (5) the temperature when curing was not sufficiently high. To these may, I think, be added another reason, namely, that the officer in charge of the trials did not reside at Maha Illuppallama, but in another part of the Island, visiting the station once a fortnight or so. Mr. Cowan, I believe, explained the unsatisfactory results by stating that the area under cultivation was not large enough to produce the necessary temperature, and that planting was done too late.

3. The system under trial at Maha Illuppallama was the Sumatra, and inconclusive as the results were, they afford no grounds for encouraging another trial of the Sumatra system. It is a local system, and I have never heard of its being successfully introduced on a large scale in another country. The American process of curing tobacco in a house heated by a flue is on a different basis, because the whole operation can be brought under systematic control applicable to other countries besides America. It has been successfully introduced into South Africa, Nyassaland, Rhodesia, and a beginning is being made with it in Portuguese East Africa and British East Africa. While it is necessary to have a trained man in charge of the operations, the process has been sufficiently systemized to enable effective departmental control to be maintained. I am of opinion we should give flue curing a trial here.

4. We have Rs. 10,000 voted in the current Estimates for experimental cultivation of tobacco, and I recommend using part of this amount in procuring the services of a tobacco planter experienced in the American process of flue curing. Much will depend upon getting a thoroughly experienced and practical man. He must have been a successful tobacco planter, and have successfully cured tobacco in flue houses for the European market, not one who merely knows how to do it, but who has done it. I recommend that the United States Department of Agriculture and the Union Department of Agriculture, Pretoria, be asked to recommend us one or two men from among whom we could select.

5. I would suggest offering a contract at £700 for a year, subject to extension at the same annual salary to three years. Assuming that we could secure a man by the middle of January or beginning of February, some Rs. 5,500 would be absorbed in his salary and expenses, leaving Rs. 4,500 for rent of a block of land, labour, and seed.

6. His first duty would be to visit Jaffna and report upon the prospects of successfully introducing flue curing in that district, and upon the report being favourable, the next step would be the securing of a block of land of not less than 50 acres probably, and the immediate planting of trial plots with new types, the seed of which he would have brought with him. If his report on Jaffna proved unfavourable, then Teldeniya or some other centre would be chosen for the first experiment.

Enclosure No. 2. (Letter No. 191 of August 23, 1912).

19. Representations have been made to me that the present arrangement of having our work done at Mr. Bamber's laboratory is not satisfactory, and that we require a chemist of our own at Peradeniya. The facts seem to be that last year little or no work was sent in by the Department to Mr. Bamber's laboratory, though many analyses were done for the Agricultural Society, and no case can be quoted in which work having been sent in was not properly attended to. There are thus no grounds for the statement that the present system does not work satisfactorily, it never having been thoroughly tried.

20. In young Colonies Government chemical laboratories are sometimes established for dealing with the work of the planting or farming community, but in Ceylon this work appears to be sufficiently catered for by private enterprise, with which, of course, the Government would have no desire to interfere. The analytical work of the Department itself is not, I should think, likely to prove too much for the Colombo laboratory. If and when it did, it would then be time enough to consider the establishing of a laboratory of our own.

21. In previous correspondence (see my letter No. 137 of June 10, 1912) I have referred to the importance of the rubber industry to this Colony, and the need of detailing a member of the staff to devote himself to the investigation of the problems connected with rubber cultivation. We have also to consider the position of Ceylon in the field of scientific research, and to see that she is not supplanted by progressive States in the leading position she has occupied and still occupies.

22. We require a trained man for carrying out a thorough investigation in Ceylon into the tapping, coagulation, and general preparation of rubber. Such investigation would absorb the whole of his time, and should be continued for a period of at least three years.

23. The present occasion offers an opportunity for the Government and the Committee of Rubber Research (the names of whom I attach) to secure the services of such a man.

24. Certain minor daily tests of latex, both chemical and physical, would be performed in the field or factory, but any analyses required by the Committee could be done at the laboratory, Colombo.

25. The scheme of work would be (generally speaking) that drawn up by the Research Committee in Ceylon on the lines suggested by Professor Dunstan, and the rubber produced as the result of the various experiments would be submitted to the Committee and forwarded to the Imperial Institute for further analysis, vulcanization, and submission to the most approved tests of manufacturers and any others that may be determined later.

26. The vulcanization experiments can best be done in England, as they will be more comparable with the practical work performed in factories.

27. For this purpose it is proposed to erect a special manufacturing plant in the basement of the Imperial Institute where electrical power is available. Here it would be under the control of the Director of the Imperial Institute and certain chemists employed in the investigation, the vulcanizing tests being carried out by an experienced vulcanizer from one of the large manufactories.

28. Funds for this plant are provided by vote No. 3128, Miscellaneous, Rs. 6,000.

29. The vulcanizer's work would be to vulcanize the experimental samples sent from Ceylon by a standard method for comparison, but would also include vulcanizing experiments with other Ceylon rubbers to determine the mixture, temperatures, pressure, and time required to give the best results.

30. This branch of the investigation will be of equal importance to the investigations in Ceylon, as it is now well known that slight modifications of any of the above conditions affect profoundly the quality of the final product.

31. The total expenditure involved for the current year is estimated to be as follows :—

	Rs.
In Ceylon.	
(1) One trained investigator at £500 for eight months (£333) ..	5,000
Travelling and incidental expenses (£80)	1,200
House allowance for eight months	360
(2) One creping machine	2,000
(3) Purchase of latex (£150)	2,250
In England.	
(4) Vulcanizing plant	6,000
(5) Trained vulcanizer for six months at £500 per annum ..	3,750
Total ..	20,560

32. This expenditure would be shared by the Government and the Committee in the following proportions :—

	Rs.
Government.	
Item Nos. 2905 and 2906 for eight months	3,400
Item No. 3128	6,000
	9,400
Leaving to be provided by the Committee	11,160
Total ..	20,560

33. The resulting rubber would be available after trials for sale. Estimating 50 per cent. saleable, the return would be Rs. 1,125. This revenue should go to the Committee, reducing their contribution to Rs. 10,035 (£669).

34. As these trials would be under the control of the Committee of Rubber Research, the Government should be represented on the Committee, presumably by the Director of Agriculture.

Enclosure 3. (Letter No. 191 of August 23, 1912.)

8. With the appointment of a Curator we should be able to make a beginning in the direction of popularizing the gardens. The system of labelling has been devised principally for the benefit of botanists, but though there will be no need to neglect the interest of scientific men, the interests of the public who provide the money for the upkeep of the gardens should also be considered and, indeed, come first. I propose, therefore, to re-label the plants in such a way that a layman looking at a particular plant or tree will derive some idea of its use or value. This can be done in most cases by the addition of a word or two, such as rubber, oil, tannin, dye, spice, drug, perfume, foliage plant, flowering shrub, fibre, timber, &c. Each plant should bear a serial number, and a short description given of it in a catalogue for ready reference by visitors. Many plants have no label at all.

Enclosure No. 4. (Letter No. 238 of November 8, 1912.)

With reference to previous conversations on the subject of forming a Royal Botanic Gardens Committee to advise the Director on matters concerning the welfare of the Royal Botanic Gardens, Peradeniya, I have the honour to inform you that on the 5th instant Mr. Green, Mr. Petch, and Mr. J. H. de Saram, whom I had invited to join us, discussed the proposal with me, and that we came to the following conclusions.

2. As the Committee could not relieve the Director of ultimate responsibility with regard to all that takes place in the gardens, its functions would be purely advisory, and it would always remain with the Director to accept or reject the advice of the Committee at discretion.

3. Questions affecting the administration of the gardens would not come within the scope of the functions of the Committee, the Curator under the Superintendent being responsible for the administration.

4. Within these limitations it was thought that the duties of the Committee should not be strictly defined. My object is to make sure that every part of the gardens should come under systematic inspection at least twice a year, avoiding the risk of parts out of the usual beat becoming neglected. It was the opinion that this could best be effected by staff inspections, say, monthly, such inspections to be conducted by members of the senior staff who happened to be at Peradeniya when they occurred.

5. The Committee would meet, it is suggested, once a quarter, and, besides making a general inspection of the gardens, would consider questions upon which the staff inspection sought their advice.

6. The Committee should consist, it was proposed, of the Director of Agriculture (Chairman) and Superintendent of Botanic Gardens *ex-officio*, Mr. Green, Mr. Petch, Mr. J. H. de Saram, and Mr. Hedgeland, and I have accordingly to recommend for His Excellency's consideration the appointment of these gentlemen to serve.

DEPARTMENT OF AGRICULTURE, CEYLON.

SCHEME OF ORGANIZATION.

THE DIRECTOR OF AGRICULTURE.

TECHNICAL AND ADMINISTRATIVE. — **CLERICAL (Head Office).**

SECTIONS.	DIVISIONS.	STAFF [1913-14].	PRIMARY DUTIES.
Systematic Botany Physiological Botany Herbarium Library Systematic Mycology Plant Diseases Quarantine Mycological Laboratory	BOTANY AND MYCOLOGY	1. BOTANIST AND MYCOLOGIST 2. Assistant Botanist and Mycologist Field and Laboratory Assistant Draughtsman Plant Collector Herbarium Attendant Librarian Museum Attendant	1. Supervision of work of division; investigation of plant diseases; advising on importation, prohibition, and on measures for the suppression of plant diseases; advice to the public; visits to estates; field experiments and demonstrations; drafting of regulations; preparation of reports and bulletins; compilation of a "Fungus Flora of Ceylon"; formation and upkeep of mycological herbarium and reference collection of plant diseases; correspondence and exchange; lectures; investigation in general and physiological botany and Ceylon flora; identification of plants; upkeep of herbarium; supervision and upkeep of library and catalogues; Peradeniya Annals; attending staff inspections of the Royal Botanic Gardens; attending meetings of the Committee of Agricultural Experiments. 2. Assisting Head of Division.
Coconuts Cacao Rubber Tea Tobacco Cotton Cinnamon Essential Oil Grasses Coffee Fibre Sugar Cane Artificial Manuring Green Manuring Tannins and Dyes Drugs and Spices Maize and other Cereals Fodder Plants Oil Seeds Noxious Weeds Ostriches Cattle and other Live Stock Poultry Museum Sericulture	EXPERIMENTS	3. SUPERINTENDENT OF EXPERIMENTS 4. Manager of Peradeniya Experiment Station 5. Manager of Dry Zone Experiment Station Native Assistant, Peradeniya Experiment Station Clerk, Peradeniya Experiment Station Foreman, Peradeniya Experiment Station Assistant Foreman, Peradeniya Experiment Station Conductor, Coconut Trial Ground Assistant Conductor, Coconut Trial Ground Clerk, Dry Zone Experiment Station Foreman, Dry Zone Experiment Station 6. TOBACCO PLANTER Foreman	3. Supervision of work of division; advising on the initiating and conducting experiments; carrying out experiments determined upon by the Committee of Agricultural Experiments; assisting at preparation of the agenda for the committee meetings and attending the meetings; advice to the public; visits to estates; preparation of reports and bulletins; keeping of records of all planting experiments initiated and carried out by the Department and the tabulating of results; preparation of agricultural statistics for publication in the annual reports or otherwise; lectures; shows; upkeep of Museum; attending staff inspections of the Royal Botanic Gardens. 4. In charge of Peradeniya Experiment Station; in charge of the Hevea trees at Henaratgoda; Secretary to the Committee of Agricultural Experiments; preparation of reports and bulletins; shows; the performance of such duties in connection with the work of the Department in other parts of the Island as the Director may require. 5. In charge of Dry Zone Experiment Station and of Coconut Trial Grounds; preparation of reports and bulletins; shows; the performance of such duties in connection with the work of the Department in other parts of the Island as the Director may require. 6. In charge of tobacco experiments; introducing new types of tobacco; establishing nurseries; establishing new local types; reporting on the suitability of localities and soils for tobacco; supervising the building of flue houses and the flue curing of tobacco; curing of tobacco by other processes; curing, preparation, and grading leaf for the European market; endeavouring to establish the co-operative system of curing and marketing; advice to the public; lectures and demonstrations; preparation of reports and bulletins; shows.
Economic Entomology General Entomology Quarantine	ENTOMOLOGY	7. GOVERNMENT ENTOMOLOGIST Field and Laboratory Assistant Photographer and Second Draughtsman (conioints with Division of Mycology and Botany)	7. Supervision of work of division; study of insect pests; advising on importation, prohibition, and on measures for the suppression of insect pests; researches on beneficial insects; collection and preservation of species of Ceylon insects; advice to the public; visits to estates; field experiments and demonstrations; preparation of reports and bulletins; lectures; shows, correspondence and exchange with foreign Entomologists; drafting of regulations; quarantine; supervision of Government fumigatorium; attending staff inspections of the Royal Botanic Gardens; attending meetings of the Committee of Agricultural Experiments.
Tapping and Latex Coagulation and Curing Preparation and Packing Keeping Qualities Cultivation Spacing and Thinning out Manuring Analyses of Soils, Manures, and Food Stuffs Manure Prescriptions General Agricultural Chemistry	CHEMISTRY AND RUBBER RESEARCH	8. GOVERNMENT CHEMIST 9. RUBBER RESEARCH SPECIALIST Superintendent	8. Responsible for all matters relating to agricultural chemistry that come before the Department; analyses of soils, manures, food stuffs, and other economic products; advice to the public; reporting on the coagulating, curing, preparation, and keeping of rubber; preparation of reports and bulletins; lectures; shows; assisting in carrying out experiments determined upon by the Committee of Agricultural Experiments; attending the committee meetings; attending staff inspections of the Royal Botanic Gardens. 9. Supervision of the experimental work of the Rubber Research Committee; experiments in tapping with latex flow and bark renewal, with coagulants and coagulating, with curing, keeping, and packing; carrying out the decisions of the Committee.
Royal Botanic Gardens, Peradeniya Botanic Gardens, Hakgala Botanic Gardens, Henaratgoda Propagation of Plants Labelling and Cataloguing Plants Supply and Exchange of Seeds and Plants Garden Apprentices Shows	Botanic Gardens ~~HORTICULTURE~~	10. ~~HORTICULTURIST~~ 11. Curator, Royal Botanic Gardens, Peradeniya 12. Curator, Hakgala Clerk Conductor, Henaratgoda Assistant Conductor, Henaratgoda First Foreman, Peradeniya Second Foreman, Peradeniya Nurseryman, Peradeniya 3 Upper Gardeners, Peradeniya 8 Gardeners, Peradeniya Plant-house Foreman, Peradeniya Storekeeper, Peradeniya Carpenter, Peradeniya Labeller, Peradeniya Foreman, Hakgala Nurseryman, Hakgala	10. Supervision of work of division; responsible for the administration and proper upkeep of the Royal Botanic Gardens, Hakgala, and Henaratgoda; for carrying out the decisions of the Royal Botanic Gardens' Committee as approved by the Director; Secretary to the Committee; attending staff inspections; advice to the public; lectures; preparation of reports and bulletins; contributions to the Annals; cataloguing plants of the Gardens; preparing guides to the Gardens; maintaining of a seed store and nursery of plants; supplying seeds and plants to the public; preparing exhibits for shows, lectures, and judging thereat; instruction of students; maintaining the labels of plants in an efficient condition. 11. In charge of the Royal Botanic Gardens under the Head of the Division. 12. In charge of Hakgala under the Head of the Division, and of such experiments as are required from time to time by the Head of Division of Experiment Stations.
Low-country Products Paddy Tropical Fruits Tropical Vegetables School Gardens Stock Gardens Ceylon Agricultural Society Magazines Shows Meetings Distribution of Plants and Seeds	LOW-COUNTRY PRODUCTS AND SCHOOL GARDENS	13. SUPERINTENDENT OF DIVISION 3 Inspectors of School Gardens 12 Agricultural Instructors 5 Clerks Foreman, Stock Garden Assistant, Stock Garden Gardener, Stock Garden	13. Supervision of work of division; inspecting the work of the officers; advice to the public on all matters relating to low-country products; responsible for the efficiency of school gardens; scrutinizing the reports of the inspectors; carrying out such experiments in the school gardens and other plots in the Island required from time to time by the Director; supplying the Head of Division of Experiment Stations with all records he may require; supervision of low-country products trial ground; secretarial work of the Ceylon Agricultural Society; assisting in the editing of the Journal of the Society; editing the "Govikam Sangarawa"; in charge of other publications of the Society; arranging the agenda of the Board of Agriculture and the Society's meetings; organizing shows; preparing exhibits for and judging at shows; preparation of reports and bulletins; lectures and demonstrations; distributions of seeds and plants to members of the Society.
School of Agriculture College of Tropical Agriculture	AGRICULTURAL EDUCATION		

CLERICAL (Head Office). STAFF.
Office Assistant*
Chief Clerk
Clerical Staff

Officers will have other duties to perform besides those specified in the table, all being expected to work together for the welfare of the Department and the interests of agriculture.
All officers are expected to advise the Department on important matters connected with their work without previous reference.

* Not provided for in next year's Estimates.

Peradeniya, January 8, 1913.

R. N. LYNE,
Director of Agriculture.

23-13

DEPARTMENT OF AGRICULTURE, CEYLON.

No. 1.

The Hon. Mr. R. E. Stubbs to the Right Hon. Lewis Harcourt, M.P.

No. 365. The Queen's House, Colombo,
Ceylon, June 4, 1913.

Sir,—I have the honour to transmit herewith, in the form of a Sessional Paper,* a scheme formulated by Mr. R. N. Lyne, Director of Agriculture, for the organization of the recently constituted Department of Agriculture.

2. Several of the proposals have already been placed before you in recent despatches: in the enclosed paper the Director co-ordinates all the various proposals, and explains clearly the relative functions of the various divisions which are to form the component parts of the new Department.

3. Mr. Lyne proposes that the Department should be organized as follows:—

(1) Division of Botany and Mycology;
(2) Division of Experiments;
(3) Division of Entomology;
(4) Division of Chemistry and Rubber Research;
(5) Division of Horticulture;
(6) Division of Low-country Products and School Gardens; and
(7) Division of Agricultural Education.

Each of these divisions will be under a separate head, who will be entirely responsible to the Director for its proper conduct. It will be convenient to deal with them each briefly *seriatim*.

4. *Division of Botany and Mycology.*—Mr. Lyne's proposals with regard to this division were laid before you in Sir Henry McCallum's despatch No. 5 of January 9, 1913.† In your despatch in reply, No. 141 of March 6, 1913, you stated that you were advised that it was preferable that the title of the officer in charge of this division should be "Government Botanist" or "Government Mycologist." I venture to suggest re-consideration of this point. It would, I think, be inadvisable to eliminate the designation "Mycologist" from the staff list of the Department. There is no doubt that many planters would interpret such a step as indicating that mycology, to which they attach very great importance, was to be dropped out of the scheme of work. Explanations to the contrary would be understood by few, and would soon be forgotten. On the other hand, the reputation of Peradeniya makes it desirable that "Botany" should be specifically mentioned.

In these circumstances, I cannot but feel that the advantages of a dual title outweigh the objections, and I therefore propose that the two posts in this division should be styled Botanist and Mycologist and Assistant Botanist and Mycologist respectively; the appointments have, in anticipation of your approval, been so described in the Estimates for the next financial period, which were enclosed in my despatch No. 300 of May 14, 1913.†

5. *Division of Experiments.*—Mr. Lyne discusses at some length the work which has already been carried out at the various Experiment Stations in Ceylon, and he indicates the main lines which the work of this division should follow in future. It will be observed that he proposes that a more central site should be obtained for a Dry Zone Experiment Station, and that Maha Illuppallama should in future be carried on as a subsidiary station for the sale of coconuts, or else leased or sold. Some objections have been raised to this proposal, and, pending their consideration, the Maha Illuppallama Station will be continued on its present basis.

This division is the only one which remains without a head. The Director suggests that a salary of £600 to £750 per annum by annual increments of £50 (with a house) should be assigned to this post. I think that this scale is suitable, but the increments should be fixed at £30 per annum, as in the case of the Botanist and Mycologist.

6. With reference to the post of Superintendent of the new Dry Zone Experiment Station, the Director writes as follows:—"I recommend that the salary of the Superintendent of the Dry Zone Experiment Station be on the same footing as that of the Superintendent of Peradeniya Experiment Station, namely, £300 rising by £25 to £400, and a house. Peradeniya is the senior station, but against this should be placed the unhealthiness of the low-country, recognized in the planting community as justifying higher salaries as compared with the hills. Mr. Harbord, the Superintendent at Maha Illuppallama, has been in the Government service for four years at a salary of £250, not pensionable, because presumably Maha Illuppallama was opened for cotton trials, not as a permanent Experiment Station. In the present circumstances, a permanent Experiment Station is projected, and I think Mr. Harbord should be placed on the pensionable establishment. During the four years he has acquired special experience in dry zone planting of considerable value to the Government now, and I consider his work worthy of the recognition I recommend."

* Sessional Paper XIII. of 1913. † Not printed.

I propose, if you see no objection, to appoint Mr. Harbord to the new station on the terms suggested.

A Superintendent of the Peradeniya Experiment Station has already been appointed in the person of Mr. D. S. Corlett (*vide* paragraph 3 of your despatch No. 538 of November 12, 1912, and subsequent correspondence).

A third officer, who will come under this head, will be the Tobacco Planter, whose selection is still the subject of correspondence (*vide* my despatch No. 195 of April 3 last*).

7. *Division of Entomology.*—The post of Government Entomologist rendered vacant by the resignation of Mr. E. E. Green has been filled by the appointment of Mr. A. Rutherford on a salary of £400 to £600 per annum by annual increments of £50 (*vide* your despatch No. 26 of January 15, 1913*).

8. *Division of Chemistry and Rubber Research.*—The proposals relating to Rubber Research investigations were approved by your despatch No. 538 of November 12, 1912. Mr. L. E. Campbell, a member of the staff of the Scientific and Technical Departments of the Imperial Institute, has been appointed Rubber Specialist to carry out the local investigations, and has just arrived in Ceylon (*vide* your despatch No. 228 of April 22, 1913*). I may explain that it has since been decided that Mr. Campbell should be under the control of the Department of Agriculture, instead of being directly under the control of the Committee, though he will of course work on lines laid down by the Rubber Research Committee.

9. *Division of Horticulture.*—Mr. Lyne explains in some detail the work which will be carried on by the Division of Horticulture, and the improvements which should be made in the direction of rendering the Botanic Gardens of greater value and more practical use to the public. These representations have already been before you (*vide* paragraph 6 of Sir Henry McCallum's despatch No. 573 of September 23, 1912*). His proposal that a Committee should be appointed to make a periodical systematic inspection of the Gardens is sound.

By your despatch No. 141 of March 6, 1913,* you have approved the appointment of Mr. H. F. Macmillan to be Superintendent of Botanic Gardens on a salary of £400 to £600 per annum by annual increments of £25.

The appointment of Curator at Peradeniya should be filled from outside the Colony. I agree that the salary of the post should be fixed at £252 to £360 per annum by annual increments of £12.

10. *Division of Low-country Products and School Gardens.*—In this division the Director proposes to collect the work now done by the School Gardens and part of the staff of the Ceylon Agricultural Society, including that of the Agricultural Instructors. He also describes the lines on which the utility of the School Gardens may be extended, and the manner in which the operations of the Ceylon Agricultural Society may be more usefully organized. Under the latter scheme of re-construction, the Government grant-in-aid to the Agricultural Society and the Board of Agriculture will be reduced from Rs. 30,000 to Rs. 8,000. I have not thought it advisable, however, to accord approval to these proposals until they have been further elaborated. For the present, therefore, the grant remains at its usual figure, and the Agricultural Instructors, &c., have not yet been transferred from the Society's control.

Mr. Lyne proposes that Mr. C. Drieberg, Superintendent of School Gardens and Secretary of the Ceylon Agricultural Society, should be appointed to control this division. Mr. Drieberg is now in receipt of a salary of Rs. 3,792 as Superintendent of School Gardens, and Rs. 3,000 as Secretary of the Ceylon Agricultural Society, the latter sum being non-pensionable. It is proposed, in consideration of the length of Mr. Drieberg's Government service, amounting to 23 years, and of his exceptional experience of agriculture in the low-country, which enables the Department to reach the village population, that he should receive a pensionable inclusive salary of Rs. 7,500, and the house allowance which he is now drawing, viz., Rs. 960.

11. Mr. Lyne, in paragraphs 83 to 87 of his report, refers briefly to the steps which have been taken for the training of teachers in provincial schools of agriculture. In paragraphs 88 to 92 he urges the need for the establishment of a College of Tropical Agriculture in Ceylon.

12. I shall be glad to receive your approval of the above general scheme of organization, which seems to me to be well conceived and carefully thought out. The Executive Council discussed the proposals at a meeting at which Mr. Lyne was present, and unanimously recommended that they should be approved at the earliest possible moment. In anticipation of your approval, the necessary provision has already been made in the Estimates for 1913–14.

I have, &c.,

R. E. STUBBS.

No. 2.

The Right Hon. LEWIS HARCOURT, M.P., to the Hon. Mr. R. E. STUBBS.

Ceylon.—No. 410. Downing street, July 16, 1913.

SIR,—I HAVE the honour to inform you that, after consulting the Director of the Royal Botanic Gardens, Kew, I approve the proposals which you put forward in your despatch No. 365 of June 4, with regard to the organization of the Department of Agriculture.

I have, &c.,

L. HARCOURT.

* Not printed.

IMPERIAL BUREAU OF MYCOLOGY 6 NOV. 1922

DEPARTMENT OF AGRICULTURE.

REPORT OF THE DIRECTOR OF AGRICULTURE FOR 1921.

SECTION I.

AGRICULTURE IN CEYLON.

THE year 1921 was dry in practically all districts of the Island. The weather during February-March was exceptionally dry, and there was a marked deficit of rain during the months of May, June, and July. The south-west monsoon was late and was a light one, and the rainfall of the north-east monsoon during the latter part of the year was again short, except in the north of the Island. The shortage of rain was most marked in the Central Province, and as a consequence tea crops were reduced. There were no large rushes of leaf, and this, combined with finer plucking and increased attention to manufacture, enabled tea growers to turn out a quality of tea that has never previously been equalled. Yields of rubber were not affected by the shortage of rainfall, except in a few localities. Diseases were much less prevalent, and as a consequence of unusually dry weather in May-June, pod diseases and leaf-fall were practically non-existent. Coconuts produced crops above the average, but owing to shortage of rain during 1921 it is anticipated that crops during 1922 will be short, particularly from the coastal areas of the North-Western Province. The spring crop of cacao was short. Good crops set, but they were not realized owing to the early months of the year being abnormally dry. The late autumn crop was a good one, and disease less than usual. Food crops, except in some districts, were below the average. In many areas the maha crop of paddy could not be sown at the usual time owing to the lateness of the north-east monsoon, and at the higher elevations short-aged paddies had to be substituted for the longer-aged varieties usually sown for this crop. Hill paddy crops promise to be short, and chena grains sown in October-November will yield smaller crops, except in the wetter parts of the Island. The supplies of rice caused anxiety for the greater part of the year, and for several months it was necessary for Government to exercise control over imports and distribution. The new Labour Ordinance, No. 43 of 1921, came into force with effect from December 17.

Tea.

2. A wonderful recovery in the tea industry took place during the year. Prices were exceptionally good, especially for high-grown teas. The market demanded good quality, and fine plucking was resorted to. Much greater attention was also given to manufacture, and several firms sent specialists in manufacture around the factories of the various estates under their charge, with a view to rendering assistance to estate superintendents towards the improvement of manufacture and grading. The quality of Ceylon teas improved marvellously during the year, and flavours were good. High prices were therefore maintained, and estates were able to recoup themselves of the losses of 1920 and to provide for additional expenditure and for dividends. The exports of tea during 1921 were 161,610,966 lb. black and green, against 184,770,231 lb. black and green in 1920. This was the smallest export since 1904.

3. The recovery in the tea industry resulted in an improvement in the value of tea shares. More liberal expenditure on cultivation and manuring was allowed, and new areas were opened. Permits were issued by the Department for the sale of tea plants from estate nurseries to the extent of 1,222,800 plants, and from small holders' nurseries to the extent of 104,000 plants. The census of production taken by the Director of Statistics shows the following acreages under tea :—

	Acres.
Area planted with tea under five years of age	18,311
Area planted with tea over five years of age	368,537
Area planted with tea on small properties	31,287
Total ..	418,135

4. The imports of tea seed for planting purposes amounted to 144 cwt., while the export of tea seed from the Colony amounted to 85 cwt. The efficacy of formaldehyde disinfection of tea seed at the Colombo Fumigatorium was thoroughly investigated and found to be unsatisfactory. With the advice of the Estate Products Committee of the Board of Agriculture it was, therefore, decided to prohibit the import of tea seed from all parts of British India, with a view to preventing the introduction into Ceylon of the leaf-blister disease.

5. The use of green manuring in tea still continues to spread, and the acreage planted up with green manures continues to increase annually. The value of *Gliricidia maculata* as a green manure for tea has been tested in recent years at the Experiment Station, Peradeniya. The results, so far, have been most satisfactory, and reports of trials made in certain parts of Uva are as equally encouraging. At the higher elevations *Acacia decurrens* is being generally used as a green manure and wind break in tea, but in view of the spread of the leaf disease caused by *Cercosporella theæ* from acacia to tea, the wisdom of the extended use of acacias in tea deserves very careful consideration by the industry. Red Rust disease has been prevalent at low and medium elevations, particularly in the wetter districts, but it is

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expected that this disease, which is a disease of weak bushes, will become less common when more liberal cultivation and manuring are re-adopted. Tortrix has been prevalent during the year, but estates as yet have done little to provide "Flight breaks," or to adopt the remedial measures which have been recommended as the result of careful investigations into the life history of this pest. The position in regard to the shot-hole borer pest has improved, but careful investigations are being continued. Tea termites have caused damage upon some estates, and deserve more careful attention by those interested in the industry. Mites and scale insects were prevalent in some areas. These were most noticeable during the dry weather and in areas which required more liberal cultivation and manuring. There is little danger of these pests becoming serious if the bushes are kept in generally vigorous growth.

Rubber.

6. The prices for rubber during 1921 were the lowest on record, and drastic economies had to be effected by all estates in order to avoid large losses upon working. The majority of estates found it possible to reduce very considerably their costs of production, and some estates were able, after drastic economies, to continue to work at a profit. Expenditure on cultivation had in most cases to be deleted, manuring stopped, and expenditure on roads and drains considerably curtailed. There is no doubt that Ceylon is able to produce its rubber at a low figure, and it is therefore not surprising that schemes for restriction of output do not meet with general acceptance in the Colony. In the early part of the year many of the larger estates adhered to the Restriction Scheme of the Rubber Growers' Association, whereby output was restricted by 25 per cent., but this voluntary scheme of restriction came to an end in August for want of adequate support. The average monthly prices for crêpe ranged from 43 to 64 cents per lb., and for smoked sheet from 39 to 57 cents. The demand for crêpe throughout the year was considerably in excess of the demand for sheet, and only carefully manufactured sheet was readily saleable.

7. The Fifth International Rubber Exhibition was held in London from June 3 to 17, 1921. Ceylon was well represented at the Exhibition by samples of rubber, tea, coconuts, cacao, coffee, rice (paddy), and fibres (Sisal and Mauritius hemp). The Secretary of the Chamber of Commerce was responsible for the collection of exhibits and of forwarding the same to London. The total number of exhibits amounted to about 150, and 43 awards were made by the exhibition authorities. The Ceylon Handbook was prepared by the Director of Agriculture and Mr. M. Kelway Bamber, while Mr. H. F. Macmillan, who was on leave in England, assisted, at the request of the London Committee, in the arrangements at the Exhibition. The full report of the Exhibition has been published as Sessional Paper XVII. of 1921.

8. The exports of rubber during the year amounted to 88,125,425 lb., as against 88,552,542 lb. in 1920 and 100,822,149 lb. in 1919.

9. The market was very particular in regard to quality throughout the whole year, and any consignment slightly below top quality was seriously marked down. Complaints against sheet rubbers were common, and several samples were submitted to the Department for examination and report. The complaints were chiefly directed against "mildew" and "rust." The latter defect in sheet rubber is the term applied to a thin film caused by the growth of micro-organisms in the serum constituents on the outside of freshly rolled sheet, and can be prevented by rapid drying. The trade, however, during the year, applied the designation "rust" to other than the above well-known defect. The sensitiveness of the rubber market probably had a good deal to do with this attitude of buyers.

10. Owing to the low prices ruling throughout the year for rubber and the prospect of estates making heavy losses, the industry requested Government to consider the reduction of the export duty on rubber. The question was carefully considered, and eventually referred to a Committee of the Legislative Council. This Committee recommended a sliding-scale for duties, but its recommendations did not meet with favour by the commercial interests, and, although accepted by the Legislature, were not accepted by the Secretary of State.

11. There was but little extension of the acreage under rubber during the year, and several estates contemplated the replacing of recently planted rubber with other products. The acreage returns, collected by the Director of Statistics, show that an area of 390,115 acres were under rubber in Ceylon in 1921, as against 397,894 acres recorded in statistics collected by this Department and published in last year's report.

12. The vegetative propagation of rubber has received attention during the year. Some of the buddings made at Peradeniya in September were successful, and the interest of some estates has been aroused in this question. Considerable progress has been made in Java, Sumatra, and the Malay States in the budding of rubber, and progressive estates in Ceylon, with lands still available for planting, are strongly urged to give careful consideration to the possibilities of improvement offered by budding or grafting.

Coconuts.

13. The crops of coconuts were heavy during the year, many estates reaping record crops. The number of nuts required per candy of copra was larger than usual, and in several instances estates referred to the Department for information regarding the possible reasons for such poor copra out-turn. The total exports of coconut products are shown in the following table :—

		1920.	1921.
Coconut oil	cwt.	507,527	.. 502,042
Copra	cwt.	1,357,870	.. 1,375,696
Desiccated coconut	cwt.	518,735	.. 870,943
Coconut poonac	cwt.	92,452	.. 160,699
Coconuts	nuts	9,776,479	.. 23,738,542
Fibre	cwt.	152,568	.. 205,278

The increase in the export of whole nuts has been remarkable. Before the war the export averaged between 15 and 16 million nuts, but during the war this export fell to below 5 millions, and in 1919 only amounted to 3,390,710. In 1920 some 9,776,479 were exported, while the export of 23,736,042 for 1921 is a record in the annals of the industry. The export of desiccated coconut increased considerably during the year, and showed nearly 30 per cent. increase over the previous record export of 675,060 cwt. in 1919. Exports of fibre also showed an increase above 1920, but did not reach the figures of 1919.

14. Prices were variable during the year, but were generally lower than during the previous year.

15. Cultivation continues to improve, and the tractor trials which were organized by the Department during the year attracted a considerable amount of attention. As the result of these trials, several estate proprietors bought tractors and ploughing outfits, and commenced thorough and systematic cultivation. Manuring is becoming more general, and as a result crops upon well-managed estates are increasing. The manurial trials carried out by the Department of Agriculture upon Milicent estate, Chilaw, have been continued during the year. These trials have been under discussion, and it is possible that changes will be made. The results of these trials have been submitted to very careful analysis by a sub-committee of the Estate Products Committee of the Board of Agriculture. Gate Mudaliyar A. E. Rajapakse has continued his manurial experiments upon his estates in the Negombo District. The value of manuring young coconuts is being demonstrated by these experiments.

16. Diseases of coconuts have been under investigation by Mr. C. H. Gadd during the year, and special attention has been given to nut-fall. Spraying experiments were carried out in co-operation with the Department by Delwita estate, Kurunegala, and accurate records kept. The season was a dry one, and no benefit was derived from spraying. The experiments are, however, being continued, and should provide valuable data if a wet season is experienced and *Phytophthora* diseases became prevalent.

17. The caterpillar pest (*Nepantis serinopa*) has increased considerably in the Batticaloa District during the year, and is causing serious damage. It has been scheduled as a pest under "The Plant Pests Ordinance, 1907," and remedial control measures have been provided for. A Sub-Inspector of Plant Pests was detailed for special duty in the Batticaloa District for the last three months of the year, but small cultivators of coconuts in that district appear to be quite apathetic. They are unprepared to take steps to prevent the serious damage that is being done to their trees by the caterpillar, the black beetle, and the red weevil. Unless the position improves, compulsory measures will have to be taken by the Plant Pest Board for Batticaloa to compel all growers to carry out the prescribed control measures. A serious outbreak of black beetle (*Oryctes rhinoceros*) occurred upon an estate in the Central Province, as the result of leaving about the estate large numbers of felled coconut trunks. Special efforts to clear up these logs is now being made, and it is hoped that the outbreak of this pest will be checked.

18. Again, I would draw the attention of the coconut industry to the number of dead stems which are standing in coconut growing areas. These dead stems may become the breeding places of weevils and beetles and become a serious menace to the industry. The appointment of an Inspector of Plant Pests and Diseases for the coconut districts will have to be made at an early date, and the amendment of the present pest and diseases laws taken up.

Cacao.

19. The exports of cacao were 62,244 cwt., as against 56,397 cwt. in 1921. The spring crop was a light one, but the autumn crop in most localities was very satisfactory. Prices were low in the early part of the year, but subsequently improved. Diseases were less prevalent than usual, owing to the dryness of the year. The Peradeniya Chocolate Factory began operations during the year, and turned out chocolate of very high quality.

Cardamoms.

20. The export for 1921 was 4,512 cwt., as against 3,754 cwt. in 1920. The season was too dry to be satisfactory for this crop, but some inquiries were made during the year as to the prospects for an extension of this crop. Prices during the early part of the year were satisfactory, but fell considerably later.

Cinnamon.

21. The exports of this product were as follows :—

Cinnamon quills	lb.	3,328,408
Cinnamon chips	lb.	1,471,502
Cinnamon oil (bark)	oz.	79,928
Cinnamon oil (leaf)	oz.	163,522

These exports were in excess of exports of the previous year. Prices, on the whole, were fair, but some good stocks of high quality are being held. No expansion of the industry is taking place, but experiments carried out at the Godakawela Experiment Station indicate the possibilities of this crop in the Atakalan and Kolonna korales of the Province of Sabaragamuwa.

Citronella.

22. The exports of citronella oil amounted to 1,160,555 lb., as against 1,022,809 lb. during the previous year. Development in this industry is stationary, although it is certain that large areas, at present uncultivated, exist in many parts of the Colony, which could grow citronella and lemon grasses satisfactorily.

Other Products.

23. The following were the exports of minor agricultural products during the year :—

Tobacco	Manufactured	lb.	6,074
	Unmanufactured	lb.	2,411,419
Arecanuts		cwt.	131,045
Kapok		lb.	461,652
Pepper		cwt.	474
Papain		cwt.	316
Cinchona		lb.	98,110
Coffee		cwt.	613
Ginger		cwt.	54
Nutmegs		cwt.	177
Cloves		cwt.	90

24. The tobacco crop was particularly remunerative during the year, as exceptionally high prices ruled for all grades of tobacco. Profits in the Jaffna peninsula were double the normal, and considerable sums were made by all growers. A fair proportion of these profits in Jaffna were invested in cattle, and increased acreages of land are being opened up. The demand for labour has increased, and the wages paid have again materially advanced. In other districts the profits from tobacco have been good, and there has been a considerable acreage put under this crop in the Matale District. Trials are also being made in Uva, Moneragalla, &c., and the Department has had several inquiries during the year regarding methods of cultivation, curing, and manufacture.

25. Papain still continues to attract attention, especially upon small rubber estates in the Kegalla District. The acreage under this product has increased, and some inquiries have been made as to the methods to be used for the production of the highest qualities of papain. Inquiries regarding the methods of cultivation, manufacture, &c., continue to be received.

26. The acute depression in the rubber industry has resulted in a very large number of inquiries being made from the Department in regard to the prospects of other economic crops. These have included questions regarding the prospects of the following crops :—Tobacco, limes, pineapples, cotton, arecanuts, coffee, fibres, sugar-cane, &c. A good deal of additional work has thereby been thrown upon the Department, but it has endeavoured, as far as possible, to supply information which would be of value to the prospective cultivators. The prospects of a lime-growing industry have been carefully investigated, and the results of these inquiries have been published. Demands for lime seeds have been met, and there will shortly be experimental plantations of limes made in several districts. The possibilities of pineapple cultivation and the prospects of a canning industry have been considered and details published. Assistance has been given to parties who have made prospective investigations regarding the commercial possibilities of this industry in Ceylon. Attempts have been made to encourage cotton cultivation in those districts of the Colony to which it would appear to be suited. The free distribution of seed has been undertaken, and experimental areas have been opened out on Government account in the Hambantota District. As the result of this work inquiries for land for cotton cultivation have been made by the Colombo Spinning and Weaving Mills and others, and assistance has been given to them in the selection of suitable localities. An examination of the prospects of the black cotton soils of the Mannar District was made during the year. The flotation of a company for the cultivation of Sisal fibre at Maha Illuppalama was completed during the year. Orders have also been placed for machinery for dealing with the Sisal and Mauritius hemp, which has been planted in recent years on the Anuradhapura Experiment Station. The cultivation of Robusta types of coffee is extending, and trials are about to be made at the Experiment Station, Peradeniya, with supposedly disease-resisting hybrids of the Arabian type. Further experiments in the distillation of camphor have been undertaken, but the results so far have not been encouraging. The experimental investigation of the possibilities of the cultivation of chenopodium in Ceylon has been made, and attention given to the further trial of varieties of West African oil-palms. The details of the investigations made into sugar-cane were published during the year.

Food Products.

27. Continued encouragement has been given during the year to the cultivation of foodstuffs. The Colony is dependent upon India and Burma for large quantities of rice, and the efforts made by the companies formed for the local production of this grain upon a large scale have not met with great success. The Minneriya Company was obliged to close down during the year, and the acreages opened by other companies did not come up to anticipations. The difficulties in opening up large extents of jungle lands are considerable, and progress in this direction cannot be rapid. The best success was achieved by Mr. W. A. de Silva under Nachchaduwa. Over 500 acres were opened, and satisfactory crops reaped. It is now proposed to continue the cultivation upon these lands on the share system, and it is probable that other food-producing companies will eventually adopt this system. In the Eastern Province permits for chenas have been reduced, and a corresponding increase of land under paddy has been the result. Some 5,000 acres of new paddy lands have been opened by small cultivators, and a portion of this area has been financed by the Batticaloa Paddy Bank. Demands for financial assistance from the bank exceed the supplies of capital. Overhead charges for supervision have proved heavy, and some renewal of loans, where crops have been deficient, has been necessary. It is hoped to constitute this bank as a Central Bank under the Co-operative Ordinance at an early date, and to attempt to attract outside capital to it either in the form of shares or as deposits.

28. Food control was withdrawn from February 28, 1921, and was again enforced by Government from June 29 to October 27, owing to shortage of supplies on the Rangoon market. During control, prices for the locally-grown paddy ruled high, but immediately control was withdrawn the prices fell.

29. The question of a subsidy for the paddy industry was again considered during the year, but beyond the assistance given in the way of grants of land free of rent and water rates for five years, free transport on the railway upon all locally-produced paddy or rice, and the retention of the higher rate of import duty it was not found possible to adopt additional forms of subsidy. The free transport granted upon the railway amounted in some months to Rs. 10,000, and steps are being taken to make better known to all village cultivators the value of this concession by Government to the paddy industry.

30. The paddy crops were generally below the average during the year owing to the shortage of rainfall. The maha sowings were particularly late, and only short-aged paddies could be used. Special efforts have been made to encourage the use of green manures, and in several localities this practice is considerably extending. Transplanting has also been considerably encouraged during the past few years, and it is now possible to find transplanting being carried on in localities where it was unknown two to three years ago. Progress has been made particularly in the Kegalla and Matara Districts. All lands suitable for transplanting in the Central Province are now so dealt with, and the gradual progress has been the result of continuous efforts made by the officers of the Ceylon Agricultural Society and of the Department of Agriculture.

31. The experience of the past few years has emphasized the importance of increasing the yields from existing paddy lands if a greater local production is to be expected. Ceylon paddy lands are relatively poor when compared with the paddy lands of other countries well known for their production of this grain, and if remunerative crops are to be secured, more intensive forms of cultivation must be